Grazing as a nature management tool

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Summary
Samenvatting

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How to graze?

Bakker et al. (2003) posed the question "to graze or not to graze". This question related to the management of salt marshes for nature conservation. Ten years later there is general consensus in the Netherlands that livestock grazing on a salt marsh can be beneficial for the biodiversity of a salt marsh. The question remains, however, how to graze? It is unlikely that one 'perfect' grazing regime exists that maximizes diversity in every system for all groups of organisms. To shed light on this we studied effects of grazing treatments on bird abundance and diversity on salt marshes where we experimentally manipulated the grazing regime.

Livestock grazing has direct and indirect effects on birds. Direct, by e.g. trampling nests or disturbance of breeding birds. Indirect by e.g. changing the vegetation structure. In the Netherlands nature managers generally graze salt marshes in order to promote a higher biodiversity and birds are often a focal point. In this thesis we make recommendations on how the direct and indirect effects of livestock grazing can be used to promote bird diversity and abundance.

The study was conducted on a large salt-marsh area in the north of the Netherlands, Noard Fryslân Bûtendyks. Within the study area a unique large-scale experiment was set up over an area of 165ha. The experiment consisted of three 55ha replicates, each with five different grazing treatments in 11ha paddocks. The grazing treatments were: 1 horse/ha, 0.5 horses/ha, 1 cattle/ha, 0.5 cattle/ha and a rotational treatment, yearly alternating grazing with 1 cattle/ha with a year without grazing. The effects of these treatments were recorded during the first three years of the experiment

Distribution of birds over grazed salt marshes

We studied the diversity and abundance of birds on salt marshes both on a large scale on marshes along the Wadden Sea coast using descriptive data as well as on a smaller scale in our grazing experiment. On the large scale we used the cover of tall vegetation as a proxy for grazing intensity, while on the small scale we ourselves determined the exact stocking densities. On the large scale we found that moderate livestock grazing can be used as a tool to limit the spread of tall vegetation over a salt marsh, as well as to change the structural diversity within tall plant communities. With this type of management, the number of species and the abundance of most breeding birds can be maintained in coastal marshes.

On the smaller scale we found that there were more overwintering birds (excluding flocking species such as geese) on the 1 horse/ha treatment than on any of the other grazing treatments. A longer term experiment is however required to gain more detailed insights in the distribution of birds over different grazing treatments throughout the year.

To understand how geese are affected by different grazing treatments, we conducted a different study. In this study dropping counts were used to calculate which grazing treatments were used the most by geese. We found that in autumn goose visitation was highest in the 1 head/ha grazing treatments and lowest in the 0.5 head/ha grazing treatments. In spring on the other hand we found no difference in goose visitation between the five grazing treatments.

Direct and indirect effects of livestock grazing on birds

Livestock grazing affects the distribution of birds over a salt marsh, but it also affects individual birds both directly and indirectly. We studied the potential trampling intensity of nests by using clay discs laid out in the field and found that horses trample significantly more than cattle, likely resulting in lower survival rates of nests under horse grazing than under cattle grazing.

Indirectly, livestock grazing affects birds through the vegetation structure. We found that both Redshank and Oystercatchers choose nest sites with significantly more pronounced micropatterns (a measure of vegetation heterogeneity) than found at random sites. We also found that these micropatterns were found mostly in paddocks grazed with low densities of horses and cattle or in the rotational treatment.

Grazing may also affect the availability of food for birds. We studied the foraging site choice and diet selection of Meadow Pipit nestlings and found that breeding Meadow Pipits foraged for caterpillars and large spiders in vegetation that was less heterogeneous than vegetation at random locations. The highest abundance of food items was found in tall vegetation. These findings suggest that the creation of patchy vegetation by grazing or otherwise may not be invariably beneficial to breeding Meadow Pipits.

Conclusions

The core question posed in this thesis is how to apply grazing as a tool for nature management for birds both in terms of the choice of livestock species and in the choice of stocking densities. Grazing with high densities of livestock, such as with 1 horse/ha may lead to a homogeneous short sward (Bakker 1989). This type of sward is suitable for geese and may attract larger numbers of geese to salt marshes in autumn. Grazing a salt marsh with a high stocking density (1 horse/ha), however, increases the risk of trampling birds nests in spring and leads to less pronounced micropatterns in the vegetation. The latter is also true for 1 cattle/ha.

The rotational grazing treatment offers interesting perspectives to combine salt-marsh management goals in a single grazing treatment. The years with grazing help in the creation of in field heterogeneity i.e. vegetation structure, while the years without grazing provide disturbance-free habitat in which no bird's nests will be trampled by livestock. In general however, we recommend to apply different grazing

treatments to different salt marshes simultaneously. This will lead to large scale heterogeneity. Each grazing regime has its specific effects leading to the suggestion that a combination of different grazing regimes in one conservation area may give the best opportunities for nature management of birds in salt marshes.

Future studies

To rigorously answer how grazing regimes affects bird diversity and abundance we recommend continuation of the grazing experiment resulting in this thesis, to gain more knowledge on the effects of the rotational grazing treatment, which seems promising for the conservation of salt-marsh birds. Moreover, long-term effects of grazing can be important, because some of the birds studied have a life cycle of many years, precluding perhaps direct adaptation to our experimental change in grazing treatment. Monitoring the settlement patterns of young entering in the population and their breeding success in relation to experimental grazing treatment should deliver us long-term effects of grazing on important aspects of bird life histories and bird diversity, both crucial parameters in salt-marsh management.